

To: Matthew Betenson[mbetenso@blm.gov]
From: Crutchfield, Larry
Sent: 2017-06-14T18:14:03-04:00
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Subject: Fwd: GSENM economic analysis
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[Intro and three Sector trends 6-14-17.pdf](#)

Per our discussion...not for release at this time.

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From: **Larry Crutchfield** <lcrutchf@blm.gov>
Date: Wed, Jun 14, 2017 at 11:43 AM
Subject: Fwd: GSENM economic analysis
To: Cynthia Staszak <cstaszak@blm.gov>

Not for release at this time

Sent from my iPhone

Begin forwarded message:

From: Paul Jakus <paul.jakus@usu.edu>
To: "stowell@dixie.edu" <stowell@dixie.edu>, "justin.fischer@garfield.utah.gov" <justin.fischer@garfield.utah.gov>, Kevin Heaton <kevin.heaton@usu.edu>, "lcrutchf@blm.gov" <lcrutchf@blm.gov>, "jsuhrpierce@blm.gov" <jsuhrpierce@blm.gov>
Subject: GSENM economic analysis

Hi guys,

My colleague, Sherzod Akhundjanov, and I are still feverishly working on our economic analysis of the GSENM on Garfield and Kane counties. This is still very much a work in progress; we are probably 2-3 weeks away from having a complete first draft.

I wanted to share the Introduction and some industry trends analysis in the hope of getting comments/critiques from you. I am especially interested in what we may be missing in the industry trends analysis, with the livestock sector being of greatest interest. It turns out that ranchers were hit with three 'shocks' hitting at almost exactly the same time: the peak of the state and national cattle cycles, a

period of relatively sustained drought AND the Monument designation all occurred at in 1996 or 1997. Statistical analysis shows that the decline in the Garfield/Kane beef cow herd in the late 1990s/early 2000s coincided with declines for the remainder of the state and the nation. Herd size continued to fall in Garfield and Kane after the state began to recover, but the continued fall is highly correlated with ongoing regional drought.

We then used billed AUMs on the GSENM to do a detailed analysis of drought effects and find drought to be a key driver of billed AUMs. We included a time trend to capture any long term decline in range productivity (as outlined by Kevin and Gil Miller in an extension paper), but this effect was statistically insignificant.

Sherzod and I are still working on the per capita income analysis using two different econometric approaches: ‘difference-in-difference’ and ‘synthetic control’. These remain works in progress, and we will append these analyses to the end of the attached draft paper when they are completed.

We are aiming to get this ready by July 1 or so; I’d love to hear from you before then.

Paul

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Respectfully,
Larry "E" Crutchfield
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Neither Boon nor Bane: The Economic Effects of a Landscape-Scale National Monument

Introduction

On September 18, 1996 President Bill Clinton, using authority delegated by Congress under the Antiquities Act of 1906, declared 1.7 million acres of federally administered land in southern Utah as the Grand Staircase-Escalante National Monument (GSENM). Designation of the GSENM set off a political firestorm that has simmered, and periodically flared, over the subsequent twenty years. In the final year of President Barack Obama's presidency, a series of monument designations approaching a total of nearly 3.5 million acres in California, Maine, Nevada, and Utah reignited legislative concerns regarding the use of the Antiquities Act. On April 26, 2017 President Donald Trump signed an Executive Order 13792 directing the Secretary of the Interior to review all monuments greater than 100,000 acres and designated since January 1, 1996 to assess, among other things, the "...economic development and fiscal condition of affected States, tribes, and localities;" (Trump, 2017).

Local, state, and federal officials have long asserted that land use restrictions associated with national monuments cause economic hardship – particularly landscape-scale monuments such as the Grand Staircase. Interior Secretary Ryan Zinke has stated that the EO 13792 review will evaluate "...loss of jobs, reduced wages, and reduced public access (Eilperin, 2017)." However, recent proclamations under the Antiquities Act have been crafted to minimize disruption to ongoing economic activities that are compatible with monument designation. For example, management of the GSENM is "subject to existing valid uses" of federal land and, further, should not "...affect existing permits or leases for, or levels of, livestock grazing on Federal lands within the monument (BLM 2000)."

Given the controversy surrounding designation of National Monuments (NM), a careful analysis of the economic effects is in order. National parks have been found to be important regional economic drivers (Gabe 2016; Wilkerson 2013), and a change in designation from a National Monument to a National Park has been found to increase visitation (Cline et al. 2011; Weiler 2006; Weiler and Seidel 2004). In contrast, little economic research has examined national monument designation. This is all the more remarkable in that assertions that a newly-designated NM will cause economic damage are nearly always countered by claims that the same NM will provide an economic boon to the region. Both claims cannot be correct.

The Grand Staircase-Escalante National Monument, the first landscape-scale monument to be designated as well as the first to be managed by an agency other than the National Park Service, has had its management plan in place since 1999, making it an ideal case study to examine the economic effect of a large NM. Following a description of the GSENM, we review the three economic sectors most affected by the designation – agriculture, mining, and tourism.

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This is followed by an analysis of trends in per capita income using difference-in-difference and synthetic control methods. Designation of the GSENM has been followed by additional landscape-scale monuments in other states; thus, our results and methods have general applicability throughout public lands states.

The Grand Staircase-Escalante National Monument and its Region

The GSENM is located in Utah's Garfield and Kane counties (Figure 1). Following a post-designation land exchange the Monument achieved its final size of 1.87 million acres (about 2,920 mi²) in 1999, making it the country's largest national monument outside of Alaska. The monument extends over 49% of Kane county's area and 18% of Garfield county's area. The Monument features three distinct regions: the western Paria region, bordering Bryce Canyon NP and including the Grand Staircase geologic formation; the Kaiparowits Plateau region, located centrally and home to abundant fossil fuel deposits; and the Escalante Canyons region, extending northeast to the Monument's border with Capitol Reef NP. The topography so rugged that the GSENM contains the last named mountain range and the last named river in the contiguous U.S.

The GSENM was the first landscape-scale NM ever established, and its management differs in significant ways from previously established NMs (Ranchod 2001). First, the presidential proclamation of the Monument stated that GSENM management was "subject to existing valid rights" and explicitly noted that grazing rights would not be attenuated by monument designation. Nearly 300 mineral, coal, and energy leases were in place at the time of designation, as well as 74 grazing allotments (Ranchod 2001). Second, in contrast with previous monuments which were invariably transferred to the National Park Service to be managed under a preservation and recreation doctrine, the GSENM was to administered by the Bureau of Land Management (BLM), an agency with decades of experience managing extractive activities on public lands. Finally, landscape-scale Monuments isolate inholdings of other landowners: some 200,000 acres of land and 76,000 acres of mineral interests held by Utah's State Institutional and Trust Lands Administration (SITLA) were located within the GSENM boundaries.

Garfield and Kane counties are sparsely populated; in 1996 county population densities were 0.85 and 1.48 persons per square mile, respectively. Like many rural regions of the west, the economies of Garfield and Kane counties historically have been based on agriculture and mining. Agriculture is dominated by cattle ranching and heavy reliance upon public range administered by BLM. Garfield county experienced a short-lived uranium boom (peaking in 1980) and has an active oil field extending into the Monument. Kane county hosts a coal mine near the town of Alton, just west of the Monument and south of Bryce Canyon NP. Both counties have tourism sectors supported by nearby national parks and public lands. The city of

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Kanab, UT (Kane county) is especially well-placed on US Highway 89 as it provides easy tourist access to three National Parks Bryce Canyon, Grand Canyon, and Zion all within an hour's drive. Garfield county's Scenic Byway Utah State Route 12 traces the northern edge of the Monument and connects Bryce Canyon NP with Capitol Reef NP. The relatively small towns located on State Route 12 enjoy economic benefits from recreation and tourism. From the year 2000, when the first reliable visitor information was available, visitation to GSENM has risen from 563,000 persons per year to over 925,000 in 2016, representing an annual growth rate of almost 3.2% per year.

Effects on Key Industries in the Grand Staircase-Escalante National Monument Region

Numerous Utah officials have asserted that Monument designation has diminished economic opportunities for the region. In recent testimony about the GSENM before the House Committee on Natural Resources, a Utah official stated that Monument status has prohibited extractive industries "...which have, for over 100 years, provided jobs for residents and revenues for businesses and local governments..." (Clarke 2017). The County commissions of both Garfield and Kane counties passed nearly identical resolutions (Resolutions No. 2017-02 and No. R2017-1, respectively) in favor of adjusting Monument boundaries, specifying that "...for more than 20 years the GSENM has had a negative impact on the prosperity, development, economy...and well-being of local communities". Indeed, during the pre-designation period of 1970-1996 the annual growth rates of population, employment, and per capita income in Garfield and Kane counties were greater they have been during the post-designation period of 1996-2015 (Table 1, columns 2 and 3). However, the same can be said for the state of Utah as whole (column 4). If these measures of growth are slowing for the entire state, then the effect of the Monument on its host counties must be separated from the more general statewide trend. First, we examine the three economic sectors most affected by Monument designation.

The Livestock Industry

Local and state officials have stated that Monument designation has negatively affected the livestock industry. For example, the Garfield and Kane county resolutions note that the GSENM "...has resulted in diminished grazing rights..." The USDA Census of Agriculture does not report livestock production at the detailed level of the GSENM, so we must rely upon county-level data. Over the past nine Agricultural Censuses (1974-2012), sales of livestock products have averaged about 85% of total agricultural sales in Garfield and Kane counties, with the largest revenue source being sales of cattle and calves produced by beef cows. A key measure of market conditions facing beef producers is inventory of beef cows. Herd size follows the "cattle cycle": when market conditions are promising the beef cow herd increases and when conditions deteriorate the herd size falls. We can compare the beef cow inventories of Garfield and Kane

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counties to that of the state (net of the Garfield and Kane herds) by normalizing herd size over the time period (Figure 2). State and regional herd sizes peak at roughly the same time (1997, one year after the national cycle peak), but post-peak herd sizes diverge. The state beef cow herd hit a trough in 2002 (down 8.5%) whereas herd size in Garfield and Kane counties declined through 2007, some 28.5% below its 1997 level. By the time of the 2012 Agricultural Census the beef cow inventory in the GSENM region had returned to its average level.

The state and regional cattle cycle peaked at roughly the same time as GSENM designation, falling immediately thereafter, so it is likely that some portion of the regional decline in herd size and ranch profitability is associated with the cattle cycle and not the Monument. Yet the Garfield/Kane herd size continued to decline even when herd size in the remainder of the state began to recover. Livestock producers with allotments in the GSENM have suggested that additional regulatory burdens associated with the Monument have reduced range productivity because producers (1) have difficulty maintaining or improving water structures and fencing, (2) are prevented from re-seeding the range with desirable grasses, and (3) cannot stop encroachment of woody tree species, resulting in a less productive, decadent sagebrush ecosystem (Heaton and Miller 2015). BLM contends that Monument stocking levels are largely determined by climatological factors. Since designation, the region has suffered more dry years (15 years) than wet (6 years) as measured by the modified Palmer Drought Severity Index.

We can directly test these two hypotheses using *Billed AUMs*, the actual number of AUMs consumed by livestock and for which ranchers were charged in any given year. (An AUM measures the amount of forage consumed by a cow and her calf in one month.) These data were obtained from the BLM GSENM Field Office for the period 1996 through 2016 ($n=21$) and reflect actual livestock grazing on the Monument. Annual billed AUMs averaged 41,061 over the period, with a minimum of 15,980 in 2003 and a maximum of 65,918 in 1999. The GSENM lies almost wholly within Utah Climate Division 4, for which a modified Palmer Drought Severity Index (*Drought Index*) was obtained. Monthly *Drought Index* data were averaged for the year; the index is essentially a z-score for drought conditions, with a positive value indicating a wet year and a negative value indicating a dry year. Average conditions were slightly dry over the sample period, with a mean of -0.25 (minimum = -3.93, maximum = 4.26).

An augmented Dickey Fuller unit root test failed to reject the presence of a unit root in billed AUMs ($p=0.18$; the times series is non-stationary) but rejected a unit root in the Drought Index ($p=0.01$). The first-difference of annual billed AUMs was found to be stationary, so this form of the model was used. If the BLM contention that billed AUMs are related to drought conditions is true, one should observe a positive sign on *Drought Index*. If constraints on livestock producers are resulting in less productive range, then a negative time trend should be observed. Figure 3 shows a graph of normalized billed AUMs relative to the Drought Index; The

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parameter estimates (β) for the first-differenced model appear below, with p-values (null hypothesis $\beta=0$) based on robust standard errors reported in parentheses:

$$\Delta \text{Billed AUMs} = 1,690.86 + 2,615.88 \text{ Drought Index} \quad 86.65 \text{ Time Trend}$$

(0.741)	(0.039)	(0.829)
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The model has an adjusted R² of 0.271. A Breusch-Godfrey test, adjusted for the small sample size, fails to reject the null hypothesis of no serial correlation in the errors. The statistical model provides reasonably strong support (p<0.04) for the BLM hypothesis that drought conditions are a key driver of stocking rates on the GSENM. A one unit increase in the drought index increases annual billed AUMs by nearly 2,616, or about 6.4% of the long-term average. The model provides no support for the hypothesis that billable AUMs are declining over time as a result of declining range conditions.

The Energy Industry

An estimated 11.3 billion short tons of recoverable coal and as much as 16 billion short tons reside on the Kaiparowits Plateau (Allison, 1997). A 3,000 MW coal-fired power plant, to be placed on the Plateau and fed by locally produced coal, was proposed in the 1960s.

Transmission lines were to cross the Colorado River and connect with existing lines delivering power to southern California. However, amendments to the Clean Air Act in 1977 meant the planned power plant would not satisfy air quality standards (NEED REFERENCE). Thus, the primary constraint to coal development became transportation to off-site power generation units. Several coal transportation alternatives were examined (Environmental Research and Technology, 1980). Trucks could be used at relatively low production levels from the North and South Kaiparowits fields (<3 million tons per year) but significant upgrades would be required if Utah State Route 12 were to support heavy coal trucks. Under the medium or high production levels, either rail transport or coal-slurry pipelines would be required.

At the time of designation the major coal lease holders were Andalex Resources Corp. and PacifiCorp. In 1996 PacifiCorp was already negotiating a swap its federal leases on the Plateau for leases elsewhere, whereas Andalex was deep into its preparation of an Environmental Impact Statement (Halden 1997). Andalex held 17 coal leases covering 35,000 acres, and planned to produce 2.5 million tons per year (Rasband 1999; Allison 1997). Utah's state trust land agency, SITLA, also held about 200,000 acres of rights within the Monument; these lands were estimated to hold approximately 140 million tons of recoverable coal (Allison 1997). Finally, the Plateau's Upper Valley oil field had produced 25 million barrels of at the time of designation.

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Numerous legal scholars have noted that just because valid existing rights were to be honored, Monument designation effectively precluded use of any as yet unexploited leases (Halden 1997; Foley 1998; Rasband 1999). Even if the Andalex EIS were approved, the firm would still have faced substantial hurdles in permitting processes for mine operations and transportation of coal off the Plateau. Indeed, the firm began to negotiate a lease swap with the federal government within four months of monument designation. Both Pacificorp and Andalex eventually exchanged their GSENM leases for cash and leases on other federal lands. SITLA's mineral interests were satisfied by direct action of the 105th Congress, in the form of Public Law 105-335. This law allowed SITLA to swap its inholdings in exchange for 145,000 acres elsewhere in the state, plus a \$50 million cash payment.

Our review of energy resources suggests the primary effect of Monument designation was to preclude future energy development, which remains an opportunity cost of designation to this day. However, nothing associated with the designation affected any actively producing energy leases on Monument. As such, the GSENM did little to disturb income and jobs derived from the energy industry at the time of designation.

The Tourism Industry

Many of the annual 900,000 visitors to the region are attracted by the "Grand Circle" of National Parks in southern Utah and northern Arizona. The GSENM is located within this circle, and the trend in GSENM visitation is similar to that of nearby National Parks (Figure 4). Table 2 shows that GSENM visitation is highly correlated with visits to nearby National Parks ($0.79 < \rho < 0.87$), but is less correlated than national parks are with one another (all $\rho > 0.93$). Thus, some portion of Monument visitation is likely to be "bycatch" of Grand Circle tourists already planning to stay in the region and whose visits may not have been primarily motivated by the Monument. Burr et al. (2006) surveyed GSENM visitors in 2004 and found that only 20% of visitors stated that visiting GSENM was the primary purpose of their trip. Some 88% of visitors had heard of the GSENM before their visit and almost 90% of visitors planned to recreate on the Monument for a full day or more. Most overnight visitors (67%) preferred to camp whereas about 37% chose to stay a local motel or B&B.

Burr et al. provide an estimate of economic impact of GSENM visitation; given visitation in 2004, they estimate expenditures of \$25.3 million (\$2015) directly generating over 430 jobs. Induced and indirect effects would add almost 100 additional jobs. For counties that totaled 7001 jobs in 2004 (BEA), the GSENM is estimated to provide about 7.6% of employment. More recently Leaver (2016) used proprietary data to measure county-level dependence on the "leisure and hospitality" sector. In 2014, 48% of jobs in Garfield and Kane counties are in the leisure and hospitality sectors (not including indirect and induced jobs), providing about 40% of wage income in both counties. We also conducted shift-share analysis of employment growth

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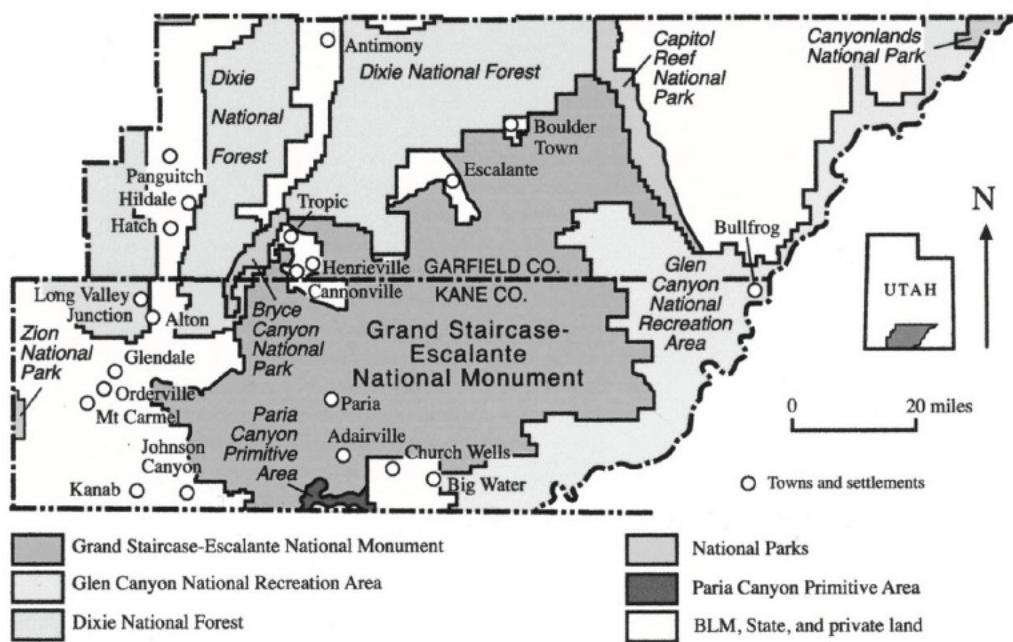
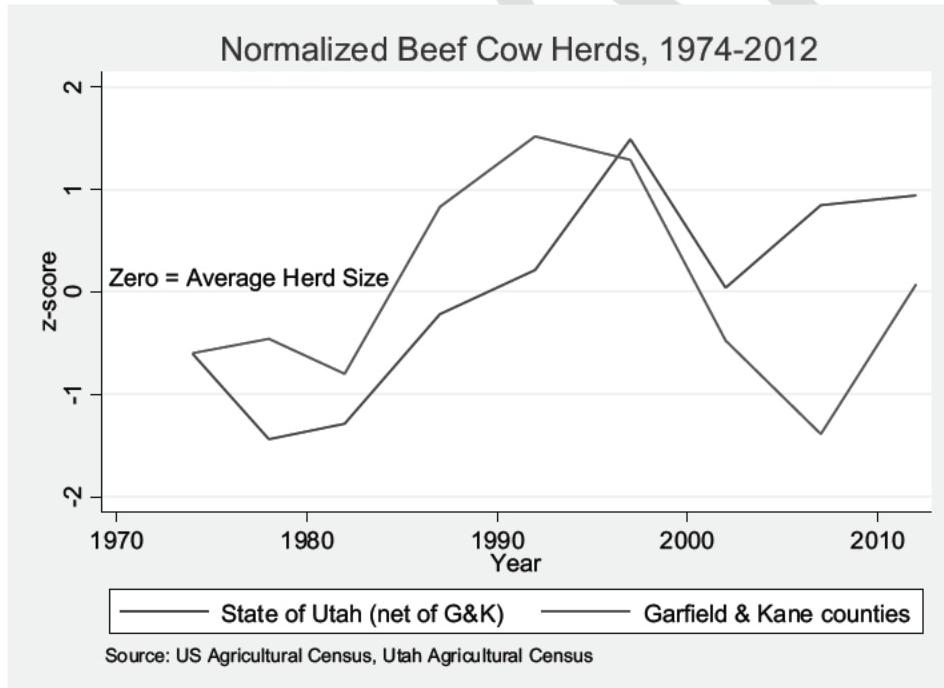
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between 1990 and 2010 in a broadly defined “leisure and hospitality” (LH) sector (NAICS Sectors 71 and 72: arts, entertainment, recreation, accommodation and food services). Analysis indicated that 75% of growth in Garfield county’s LH sector was due to its competitive share; for Kane county the competitive share was 59%. Of course, the portion of LH growth directly attributable to the Monument is unknown.

While strong employment growth in the LH sector is important in developing rural economies, some critics point to low wages and high rates of seasonal unemployment in this industry. Nationally, wages in the LH sector are about 60% of wages for all private firms, and less than 50% of wages received in the mining and logging sector (BLS 2017). Further, seasonal unemployment in Garfield and Kane counties can exceed 20%. Increasing dependence on job growth in the relatively low-wage LH sector could cause growth in per capita income to slow over time.

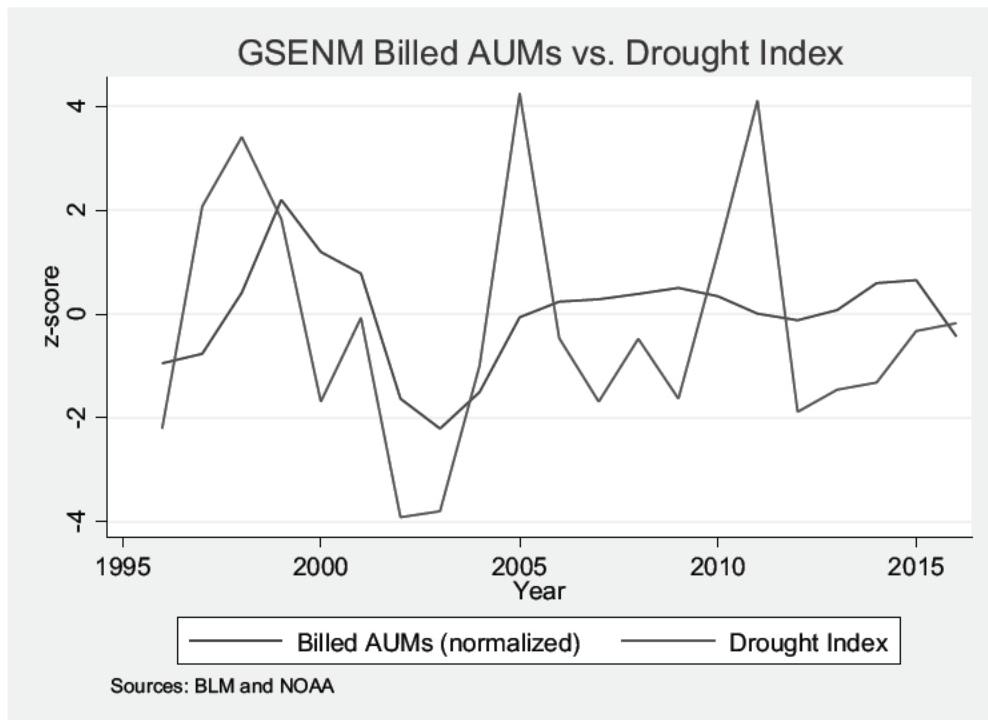
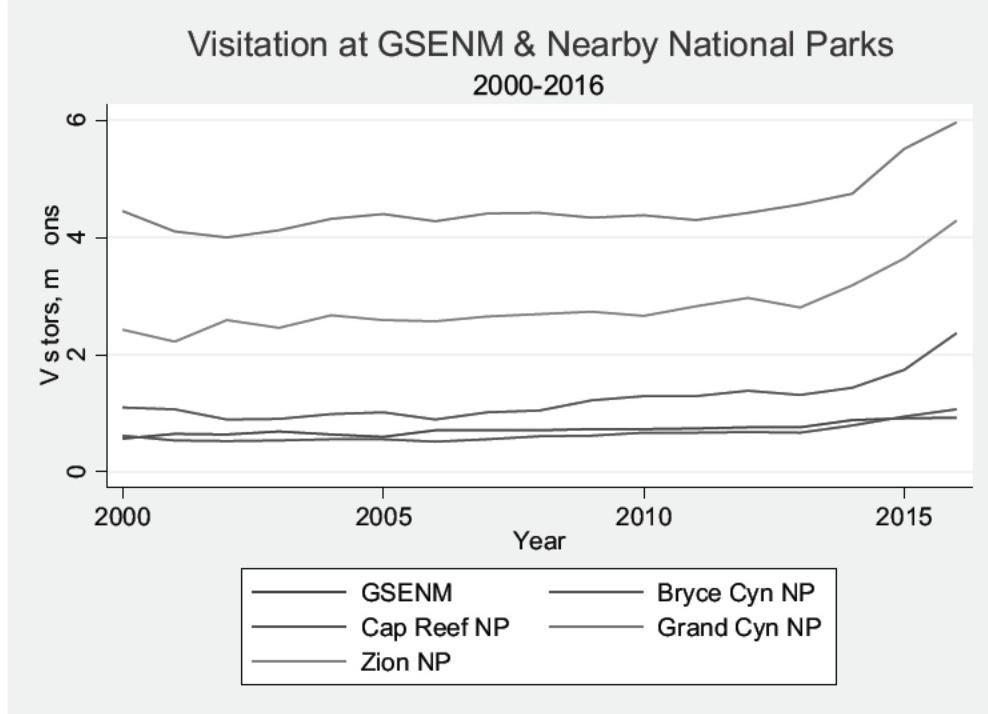
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**Figure 1: The Grand Staircase-Escalante Region****Figure 2: Trends in Beef Cow Herds, 1974-2012**

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**Figure 3: Billed AUMs and the modified Palmer Drought Severity Index, 1996-2016****Figure 4: GSENM and National Park Visits, 2000-2016**

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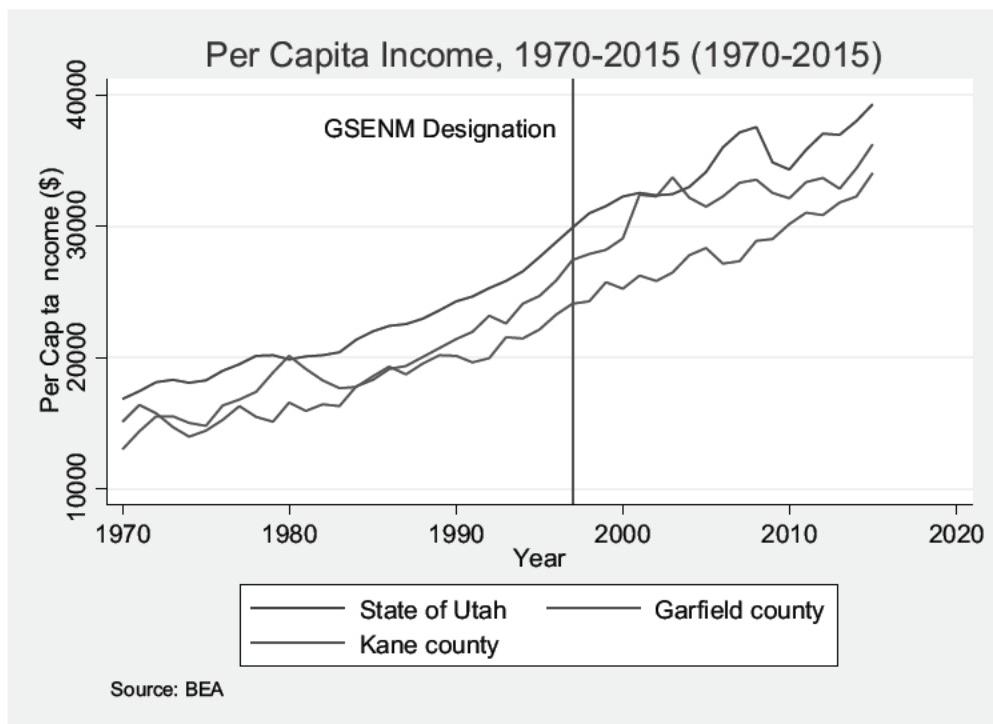


Figure 5: Trends in Per Capita Income, 1970-2015

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Table 1: Compound Annual Growth Rates, Pre- and Post-Designation

	Garfield county	Kane county	State of Utah
Population Growth			
Pre-designation (1970-1996)	1.75%	4.76%	3.55%
Post-designation (1996-2015)	0.07%	1.01%	1.97%
Employment Growth			
Pre-designation (1970-1996)	3.20%	5.94%	5.32%
Post-designation (1996-2015)	1.08%	2.14%	2.27%
Per Capita Income Growth			
Pre-designation (1970-1996)	3.10%	1.55%	2.86%
Post-designation (1996-2015)	2.03%	1.78%	1.65%

Source: BEA Interactive Data Tables

Table 2: Visitation correlations between GSENM and Nearby National Parks, 2000-2016

	GSENM	Bryce Canyon	Capitol Reef	Grand Canyon
Bryce Canyon	0.825			
Capitol Reef	0.866	0.973		
Grand Canyon	0.792	0.928	0.954	
Zion	0.868	0.940	0.958	0.947

Table 3: Garfield and Kane County Employment, by Sectors, 1990 and 2010

Sector	Garfield County		Kane County	
	1990 (1,605 Jobs)	2010 (2,643 jobs)	1990 (1,960 jobs)	2010 (3,260)
Agriculture, forestry, fishing, and mining	8.6%	11.4%	5.3%	3.8%
Arts, entertainment, recreation, accommodation, and food services	12.9%	23.2%	12.2%	16.3%
All other sectors	78.5%	65.4%	82.6%	79.9%

Source: Census Bureau

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